

OPENER:

Simplify:

a) $(-2x^2y^3)(4xy^5)$

b) $-3(x^2 - 5x + 6)$

c) $(2x^2 + 3y - x) - (x + 4x^2)$

d) $2x(x - 3) - 4(x + 7)$

Oct 19-3:44 PM

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d) $2x(x - 3) - 4(x + 7)$

$$-8x^3y^8$$

$$-3x^2 + 15x - 18$$

$$2x^2 + 3y - x - x - 4x^2$$

$$2x^2 - 6x - 4x - 28$$

$$-2x^2 + 3y - 2x$$

$$2x^2 - 10x - 28$$

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(3.4) Expanding Quadratic Expressions

How to EXPAND a Quadratic Equation

Recall: The factored form of a quadratic relation is $y = a(x - r)(x - s)$ **Remember - Standard form** $y = ax^2 + bx + c$

- First we expand by multiplying each term in the first bracket by each term in the second bracket.

This is the process of multiplying 2 binomials.

We call this process **FOIL** (First, Outside, Inside, Last)

- Then we simplify by collecting like terms.
- This results in a quadratic relation in standard form.

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Multiplying Binomials Using FOIL

$(x + 3)(x - 4)$

First Outside Inside Last

$x^2 - 4x + 3x - 12$

?

Mar 19-7:45 AM

Multiplying Binomials Using FOIL

$(x + 3)(x - 4)$ factored

First Outside Inside Last

$x^2 - 4x + 3x - 12$

$x^2 - x - 12$ standard

?

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Final Step: Combine like terms

$x^2 - 4x + 3x - 12$

$x^2 - 1x - 12$

?

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Final Step: Combine like terms

$$x^2 - 4x + 3x - 12$$

$$x^2 - 1x - 12$$

$a = +1$ $b = -1$ $c = -12$

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Multiplying Binomials Using FOIL

$$(2x + 3)(3x + 5)$$

First Outside Inside Last

\uparrow F \uparrow O \uparrow I \uparrow L
 $6x^2 + 10x + 9x + 15$

Mar 19-7:45 AM

Multiplying Binomials Using FOIL

$$(2x + 3)(3x + 5)$$

First Outside Inside Last

\uparrow F \uparrow O \uparrow I \uparrow L
 $6x^2 + 10x + 9x + 15$

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Final Step: Combine like terms

$$6x^2 + 10x + 9x + 15$$

$$6x^2 + 19x + 15$$

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$$y = (x+2)(x-6)$$

$$y = (x+2)^2$$

$$y = (x-6)(x+6)$$

Mar 31-12:12 PM

$$y = (x+2)(x-6)$$

$$x^2 - 6x + 2x - 12$$

$$x^2 - 4x - 12$$

$$y = (x+2)^2$$

$$(x+2)(x+2)$$

$$x^2 + 2x + 2x + 4$$

$$x^2 + 4x + 4$$

$$y = (x-6)(x+6)$$

$$x^2 + 6x - 6x - 36$$

$$x^2 - 36$$

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Example 2: Change the following expressions from factored form to standard form.

a) $y = -2(x-3)(x+4)$

b) $y = 3(x-4)^2$

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Example 2: Change the following expressions from factored form to standard form.

a) $y = -2(x-3)(x+4)$

$$-2(x^2 + 4x - 3x - 12)$$

$$-2(x^2 + 1x - 12)$$

$$-2x^2 - 2x + 24$$

b) $y = 3(x-4)^2$

$$y = 3(x-4)(x-4)$$

$$= 3(x^2 - 4x - 4x + 16)$$

$$= 3(x^2 - 8x + 16)$$

$$= 3x^2 - 24x + 48$$

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Example 3: Find the values of a and b

$$(x+a)(x+3) = x^2 + 5x + b$$

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Example 3: Find the values of a and b

$$(x+a)(x+3) = x^2 + 5x + b$$

$$5x - 3x = 2x$$

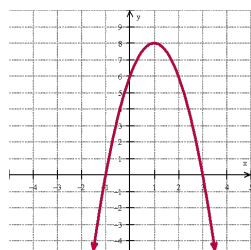
 \therefore

$$a = 2$$

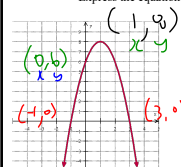
$$(x+2)(x+3) = x^2 + 5x + 6$$

$$\therefore b = +6$$

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Example 4: Determine the equation of the parabola.
Express the equation in standard form.

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Example 4: Determine the equation of the parabola.
Express the equation in standard form.

$$y = a(x-r)(x-s)$$

$$y = a(x-(-1))(x-3)$$

$$y = a(x+1)(x-3)$$

$$(1, 8)$$

$$8 = a(1+1)(1-3)$$

$$8 = a(2)(-2)$$

$$8 = -4a$$

$$-4 = -4a$$

$$-2 = a$$

Factored Form

$$f(x) = -2(x+1)(x-3)$$

$$y = -2(x^2 - 3x + 1x - 3)$$

$$y = -2(x^2 - 2x - 3)$$

$$y = -2x^2 + 4x + 6$$

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Example 5: Write a quadratic relation in standard form for a parabola with zeros at $(-1, 0)$ and $(7, 0)$ and the point $(3, 5)$ on the graph.

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Example 5: Write a quadratic relation in standard form for a parabola with zeros at $(-1, 0)$ and $(7, 0)$ and the point $(3, 5)$ on the graph.

$y = a(x-r)(x-s)$
 $y = a(x+1)(x-7)$ Factored Form
 $5 = a(3+1)(3-7)$ ↗
 $5 = a(4)(-4)$ ↘
 $5 = a(-16)$ ↙
 $a = \frac{5}{-16}$ ↖
 $y = \frac{-5}{16}x^2 + \frac{30}{16}x + \frac{35}{16}$
STANDARD $y = \frac{-5}{16}x^2 + \frac{15}{8}x + \frac{35}{16}$

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Homework

Pg. 166 # 3 – 6ace, 7bdf, 8ab, 9, 10, 11a

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